



The Regional Training Workshop
Economic Valuation of the Goods and Services of Coastal Habitats
March 24 – 28, 2008
Samut Songkram Province, Thailand



Introduction to Goods and Services of Coastal Wetland Habitats

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25 March 2008**

Outline of Presentation

- Definition of Coastal area
- Introduction to Wetlands
- Classification of Wetlands
- Wetland benefits
- Products (Goods)
- Functions (Services)
- Attributes
- Wetlands area
- Case study in UNEP/GEF South China Sea project-Wetlands subcomponent
- Wetland loss
- Conclusion

Definition of coastal area

- a coastal area defined as: *the band of dry land and adjacent ocean space (water and submerged land) in which terrestrial processes and land uses directly affect oceanic processes and uses (Ketchum, 1972)*

EXAMPLES OF LANDWARD ISSUES

- port and harbor works
- land take
- marinas and moorings for leisure craft
- power generation (e.g. wind)
- major developments (e.g. refineries, container terminals)
- coastal defenses (e.g. groynes)

EXAMPLES OF SEAWARD ISSUES

- waste disposal
- increased leisure sailing
- sea fishing
- water sports and bathing
- marine aggregate extraction
- oil and gas production
- tidal and wave power generation
- marine fish farming

↓

EXAMPLES OF IMPACTS ON COASTAL SYSTEMS

PHYSICAL CHARACTER

- loss or decline of landscape value
- disruption of sediment transport
- decline in amenity resources (beaches, dunes, etc.)
- impacts on character of coastal towns

NATURAL HERITAGE

- loss or decline of habitat
- disturbance of coastal ecosystems
- decline in fish/shellfish resources
- loss of treasured landscapes

COASTAL USE

- conflicts with rights of sea users
- incompatible uses need other locations
- pressure for services and facilities (e.g. car parks, moorings etc.)
- impacts on existing businesses and employment

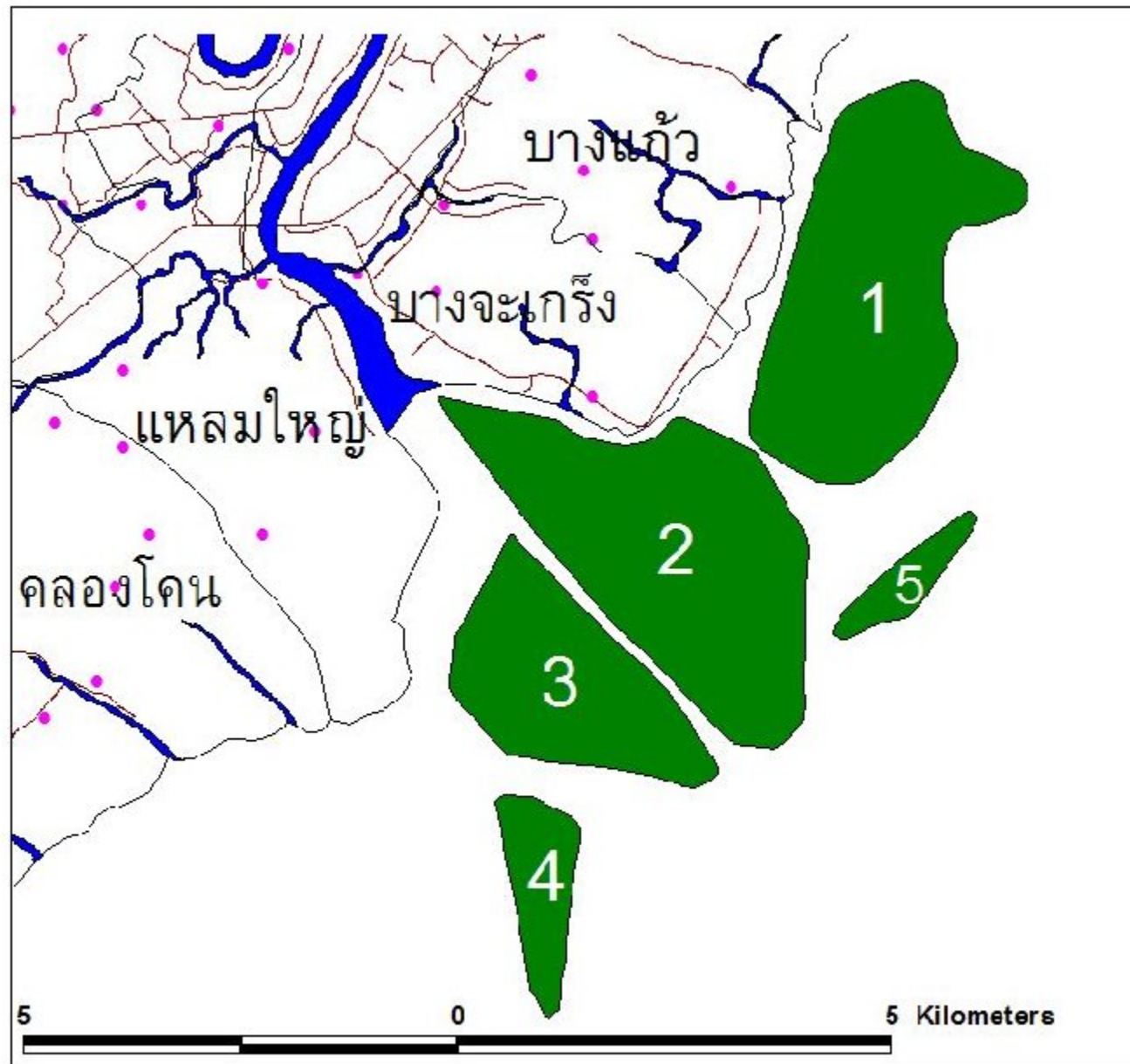
Introduction to Wetlands

- According to the Ramsar Convention, wetlands are defined as *'areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters.'*

Classification of wetlands:

- Marine: Permanent salt-water systems. Tidal or inter-tidal. Including sandy beaches, rocky shores, shallow seas and coral reefs.
- Estuarine: Means 'of the estuary'. Differs from 'Marine' in the water is brackish due to inflow from a river system. Salinity may fluctuate seasonally. As river system carries fine sediments to the estuary, mudflats are commonly found in estuarine wetlands.
- Riverine: Means 'of the river' – flowing fresh water. Usually with low vegetation cover. Floodplains also belong to the riverine system.
- Lacustrine: Means 'of the lake' = non-flowing, usually non-tidal waters. Bigger ones 'ponds'. Usually with low vegetation cover.
- Palustrine: Mean 'of the marsh or swamp' – slow or non-flowing shallow waters dominated by trees and shrubs (usually referred as 'swamps'), or persistent emergent (usually referred as 'marshes').





Don Hoi Lord

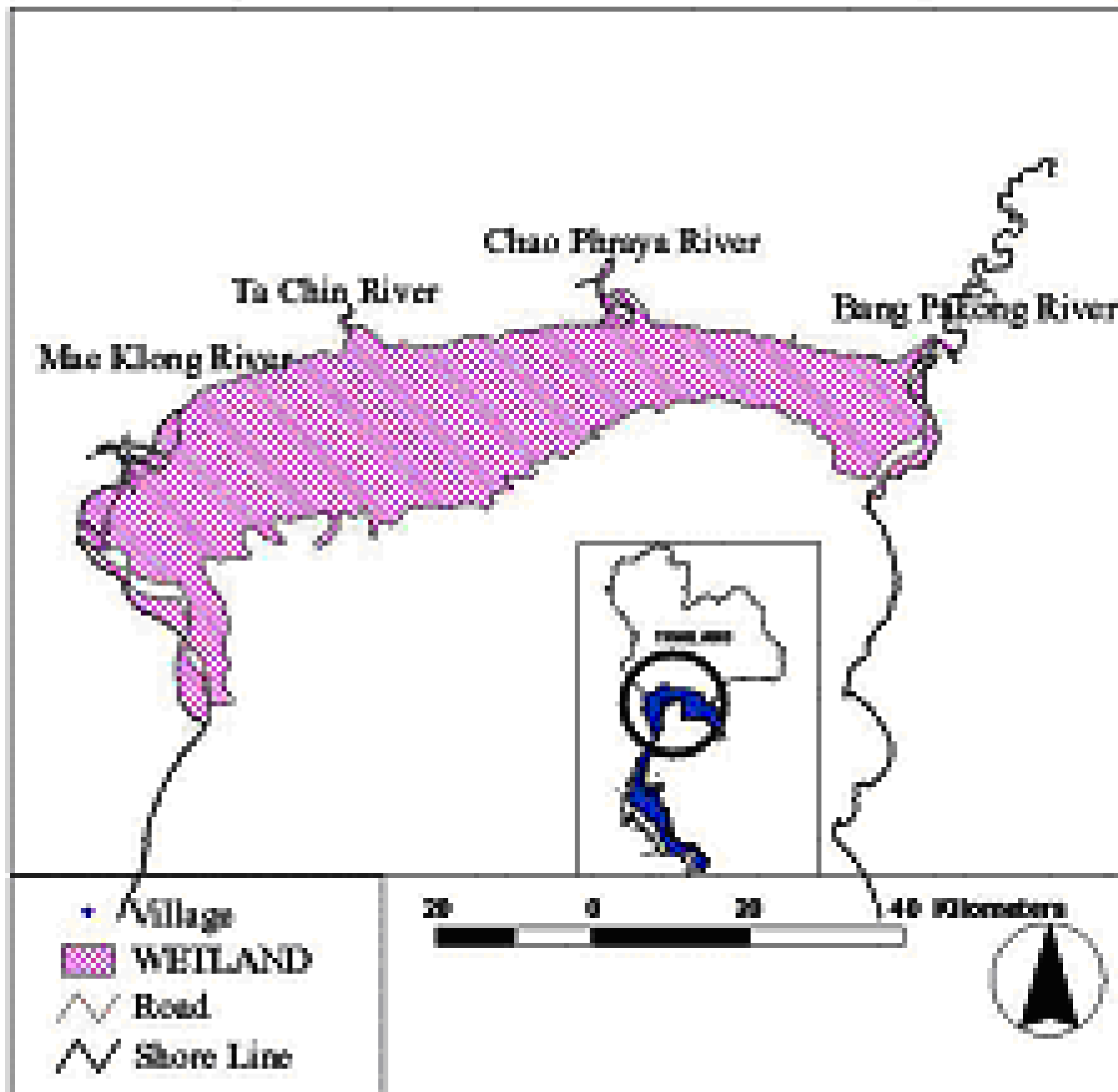
Area 2120 Ha (15126 Rai)

- Mae Khlong River
- Tambon Boudary
- Village
- Road
- Donhoilord

- 1 842.78 Ha(5267.38 Rai)
- 2 881.84 Ha(5511.50 Rai)
- 3 465.44 Ha(2909.03Rai)
- 4 158.28 Ha(939.25Rai)
- 5 79.87 Ha(499.18 Rai)

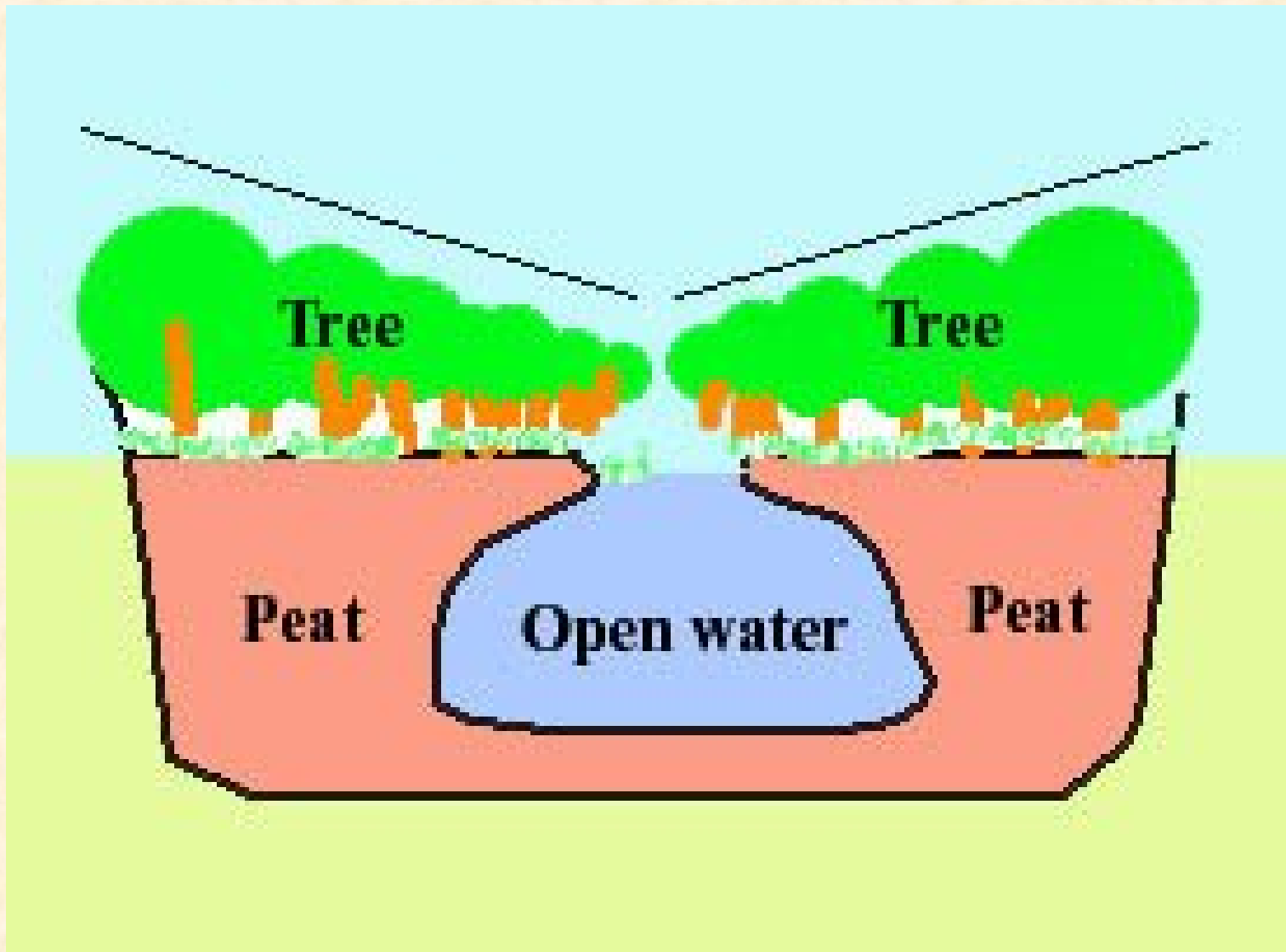


Innergulf of Thailand







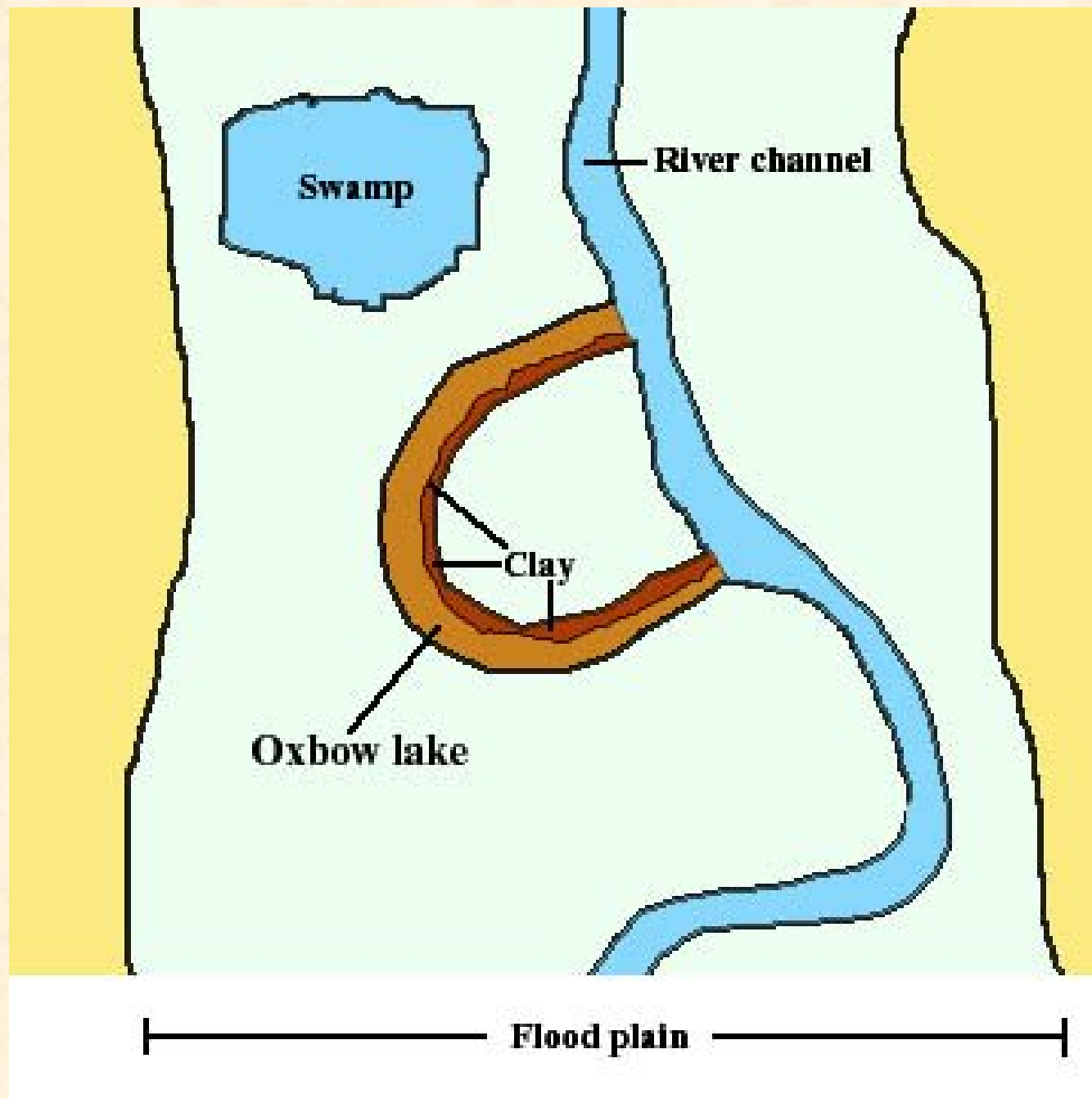




Toh Deang Peat Swamp Forest

- Ramsar site





Why is ecology important?



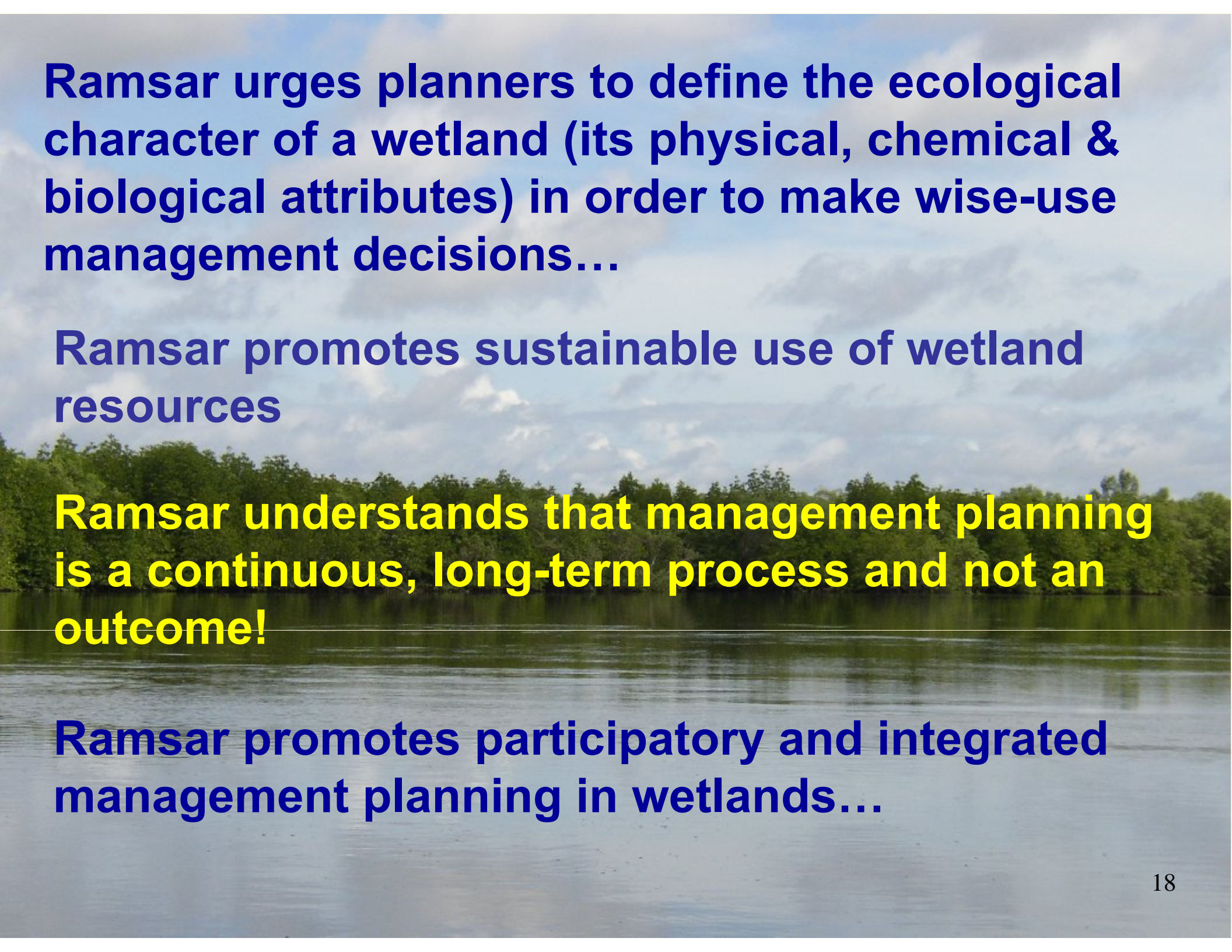


“Ecology is the understanding of how the natural world functions”



What the Ramsar Convention says about ecology...

Ramsar promotes the need to understand the ecology of a wetland (Resolution VII.10)



Ramsar urges planners to define the ecological character of a wetland (its physical, chemical & biological attributes) in order to make wise-use management decisions...

Ramsar promotes sustainable use of wetland resources

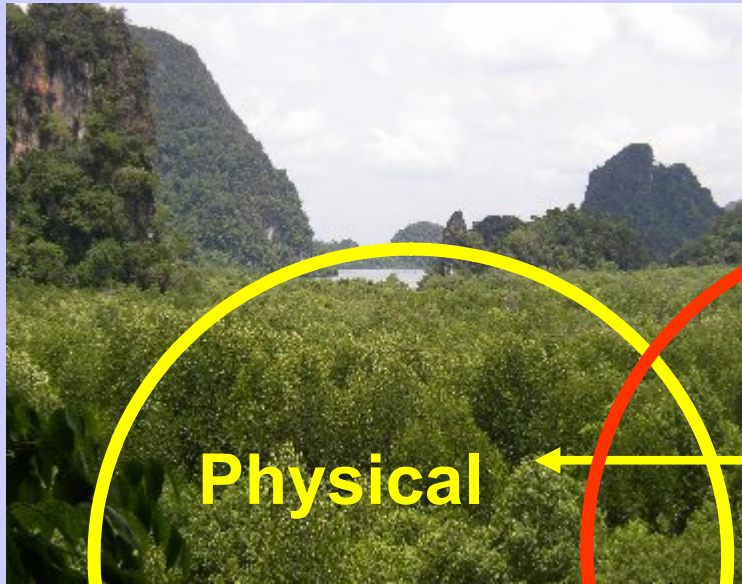
Ramsar understands that management planning is a continuous, long-term process and not an outcome!

Ramsar promotes participatory and integrated management planning in wetlands...

Defining the ecological character of wetlands

As defined by Ramsar Convention Resolution VII.10 (CoP7 San Jose, Costa Rica):

“Ecological character is the sum of the biological, physical and chemical components of the wetland ecosystem, and their interactions, which maintain the wetland and its products, functions and attributes”



Physical



Chemical



Biological

The interaction between the chemical, biological & physical environment and includes the actions of humans too!



Physical Components:

- geomorphic setting
- altitude,
- area,
- coastal stability,
- soil types,
- bottom sediments/substrata,
- water regime

Chemical Components:



The chemical properties of the water:

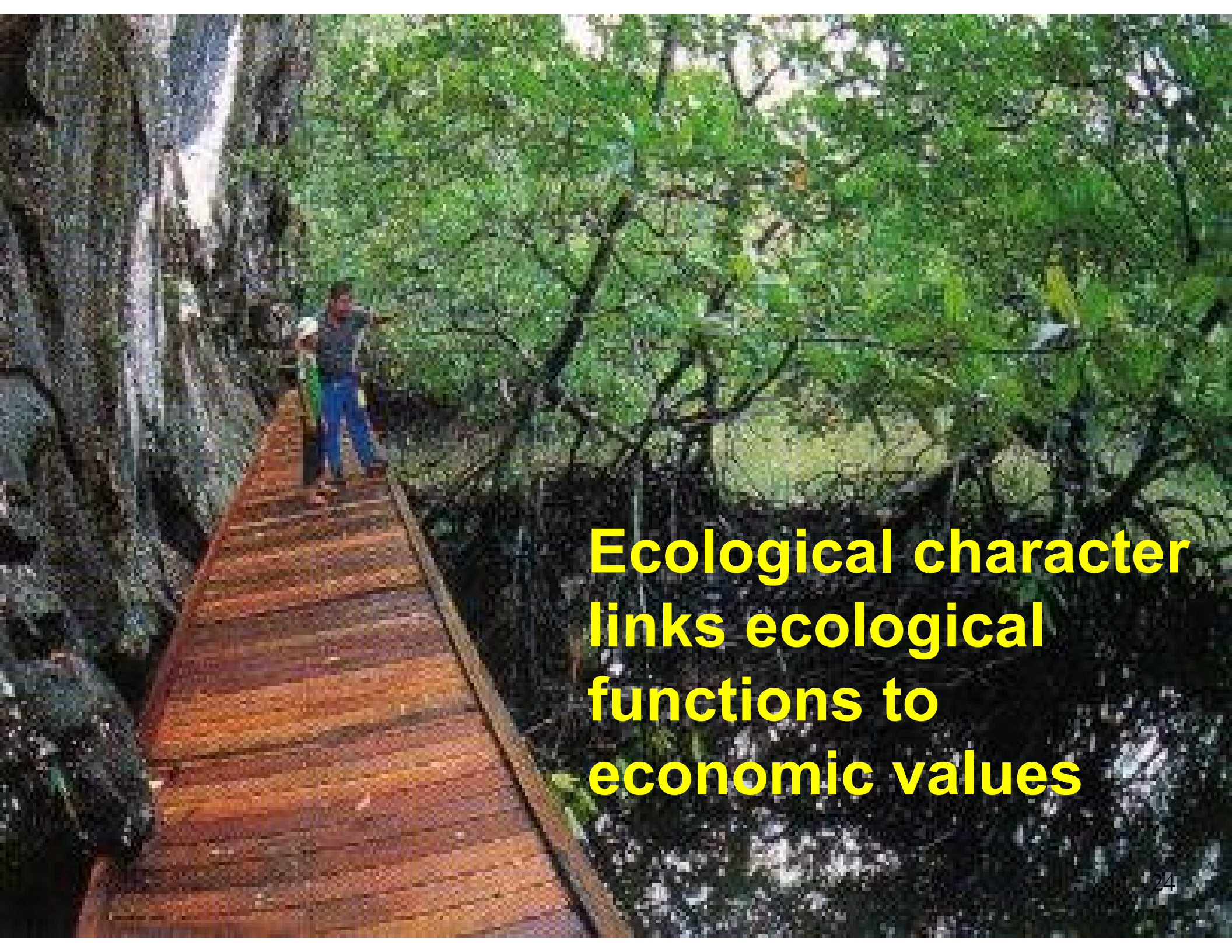
- temperature,
- salinity,
- pH,
- transparency,
- nutrient levels

Biological Components:

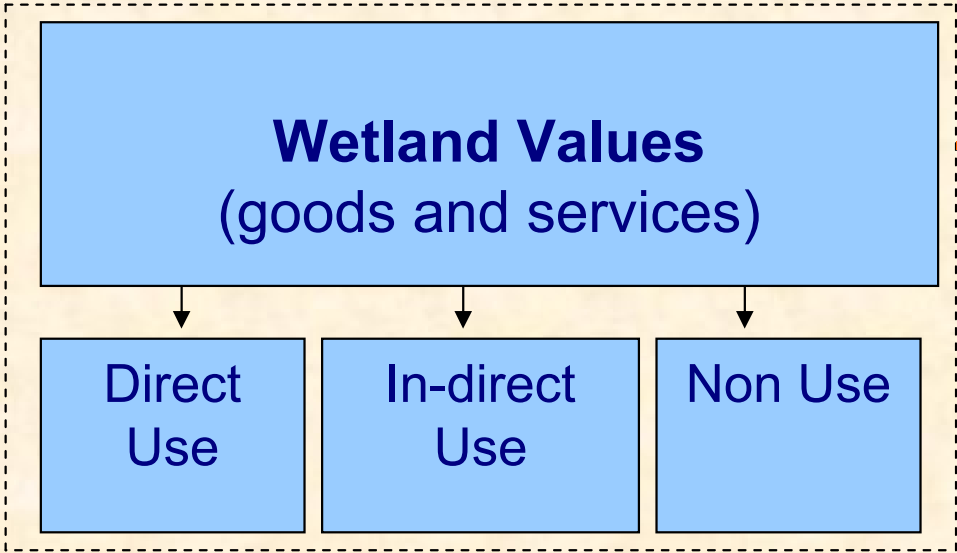
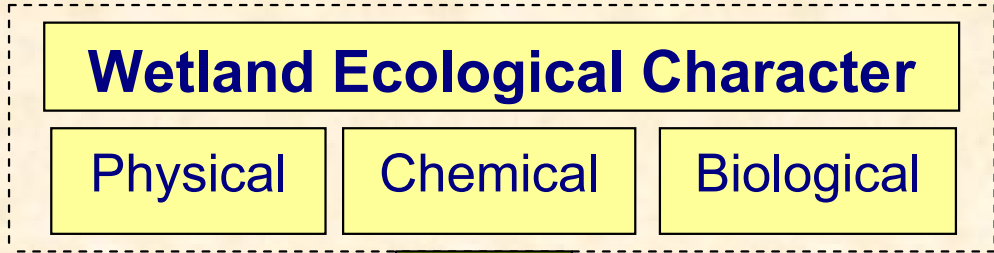
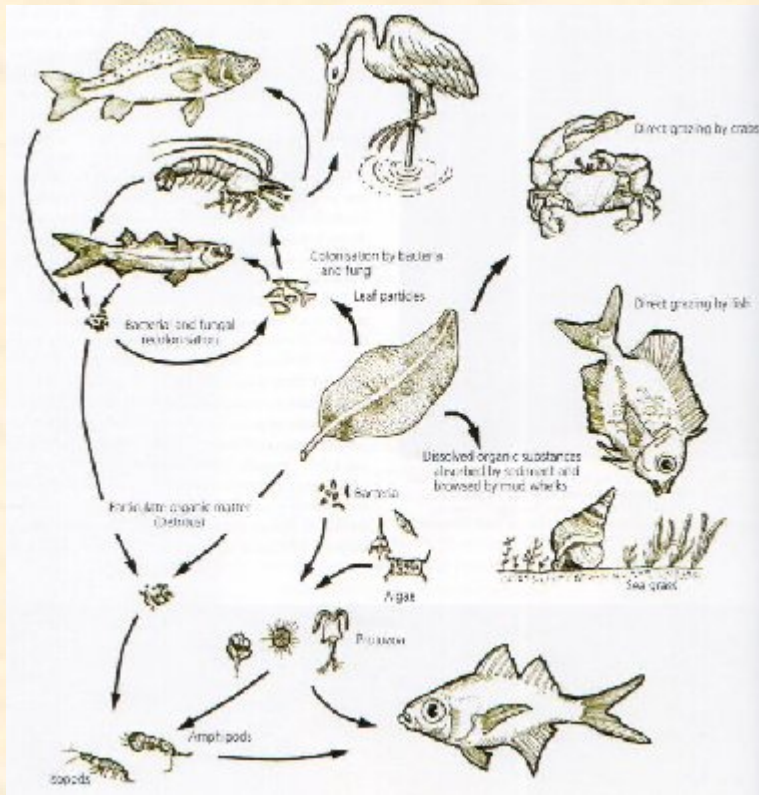


This includes all life forms (animals, plants, habitats and humans):

- Dominant groups (assemblages),
- dominant species,
- alien invasive species/pests,
- species and groups of conservation significance,
- vegetation cover,
- habitats
- (including major types and the biological significance of each)



**Ecological character
links ecological
functions to
economic values**



Wetland benefits

- *To maintain the benefits of wetlands*, good management of the wetland system and following the principles of *wise use and sustainable use* is important.
- Definition of *wise use*: “The wise use of wetlands is their sustainable utilization for the benefit of humankind in a way compatible with the maintenance of the natural properties of the ecosystem”.
- *Sustainable utilization* is defined as “human use of a wetland so that it may yield the greatest continuous benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations”.

Products (Goods):

- Forest resources. These include direct harvest of timber, firewood, medicinal plants, reeds and forest products such as honey and bee wax.
- Wildlife resources and fisheries.
- Forage resources for livestock.
- Peat. In many areas peat has been used as a form of fuel for thousands of years.

Functions (Services)

- Functions or services of wetlands are normally not measurable in monetary terms but benefit all inhabitants living near, and those using a wetland site.
- Recharge and discharge of groundwater.
- Flood control.
- Shoreline stabilization and storm protection.
- Retention of sediments.
- Nutrient retention and retention of pollutants.
- Biomass export.
- Micro-climate stabilization.
- Transportation.
- Recreation and tourism.

Attributes

- i. Biological diversity. Many wetland systems support a high diversity of wildlife, many of which are endemic or threatened.
- ii. Uniqueness to culture and heritage. Wetlands played a part in development of human history. The major cradles of civilizations were all located along river valleys.

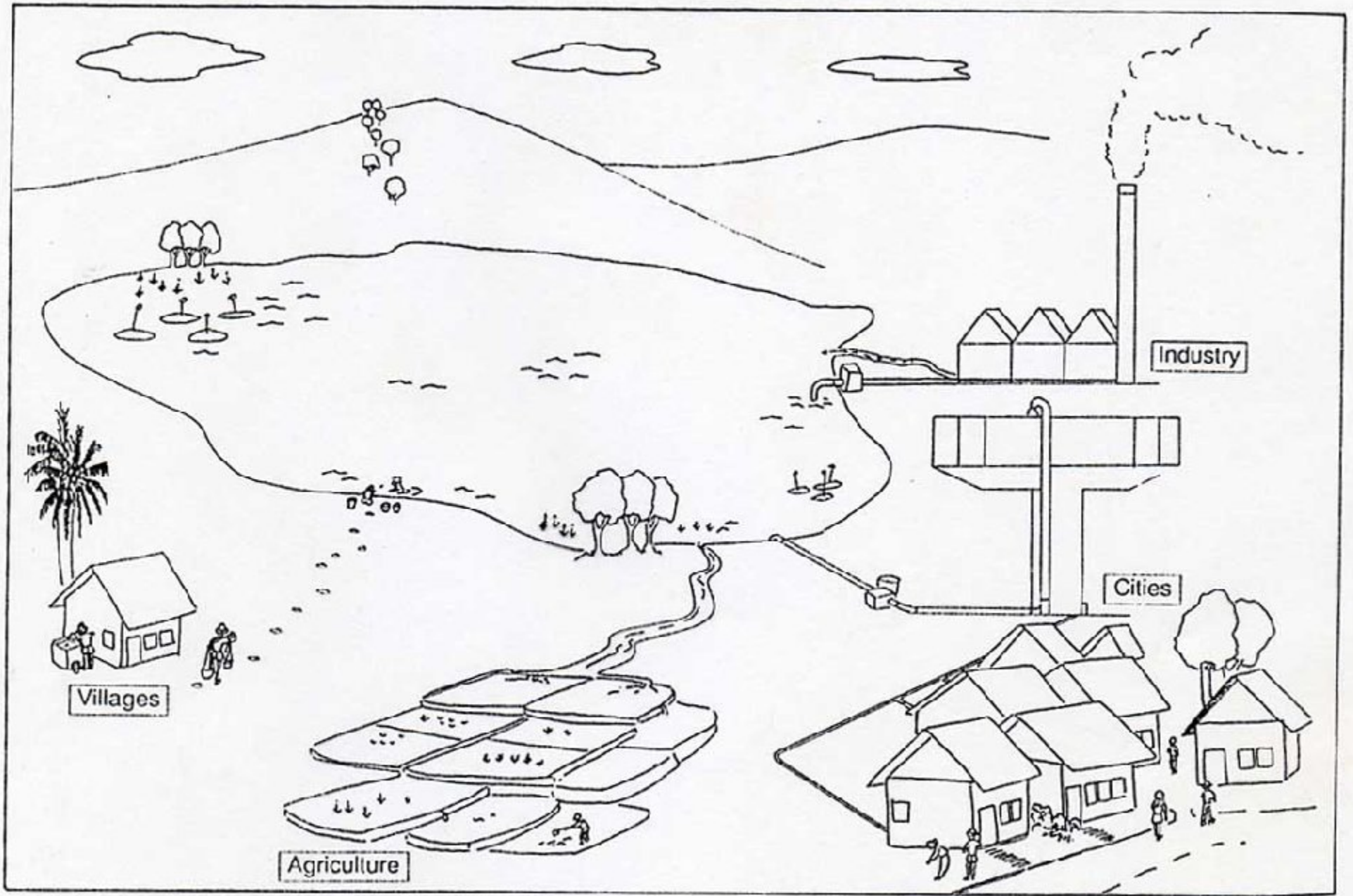


Figure Two: Water Supply - direct extraction

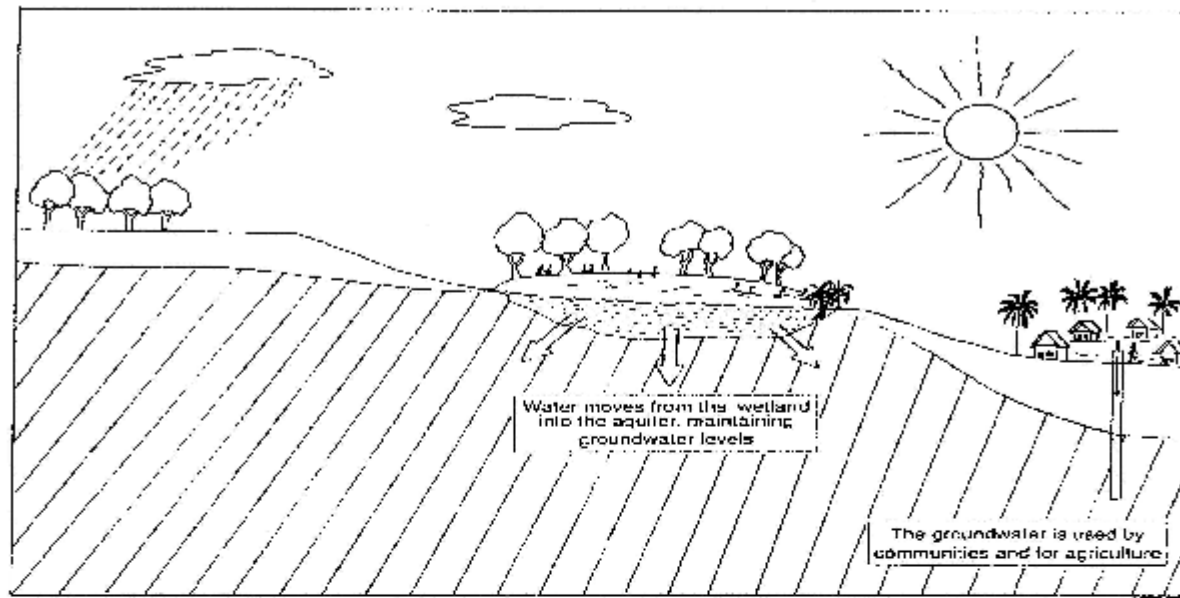


Figure 3a: Water Supply to an aquifer (groundwater recharge) WITH WETLAND

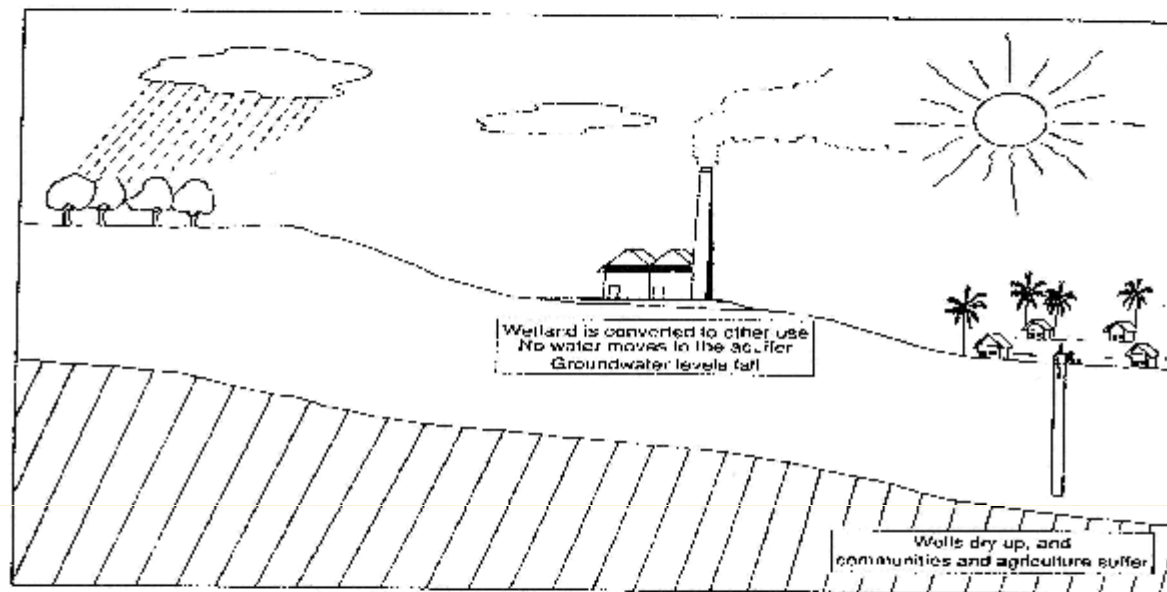


Figure 3b: Water Supply to an Aquifer (groundwater recharge) WITHOUT WETLAND

Figure Seven: Prevention of saline water intrusion - surface water

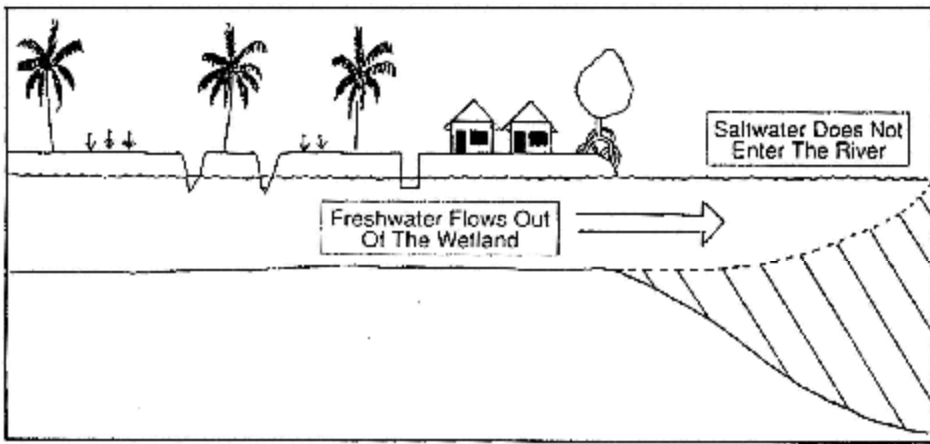
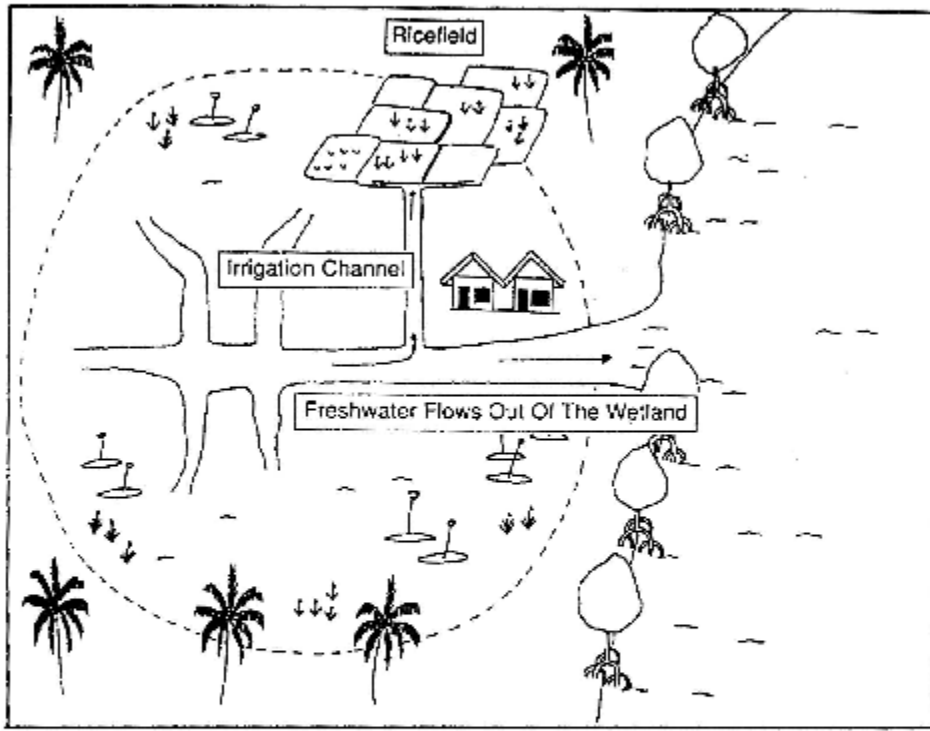


Figure 7a: With wetlands, saline water intrusion is prevented

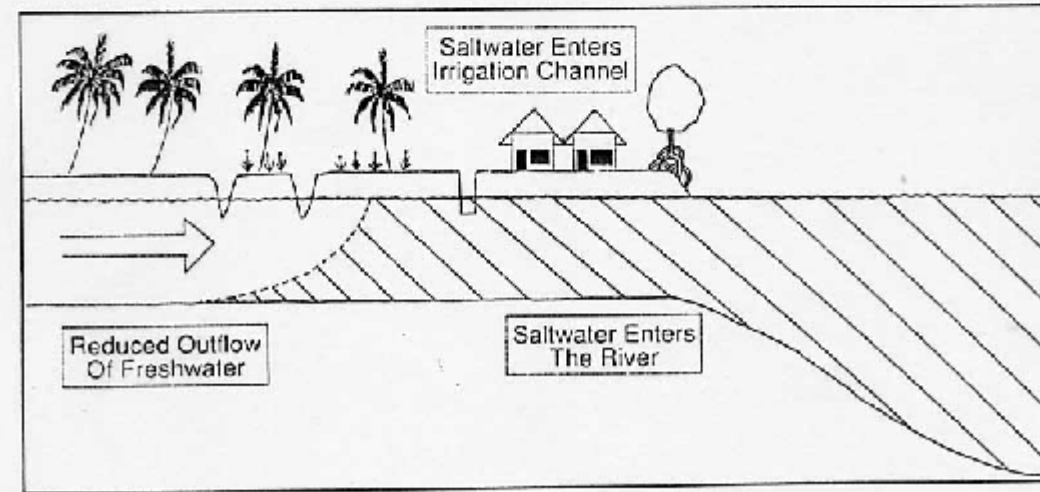
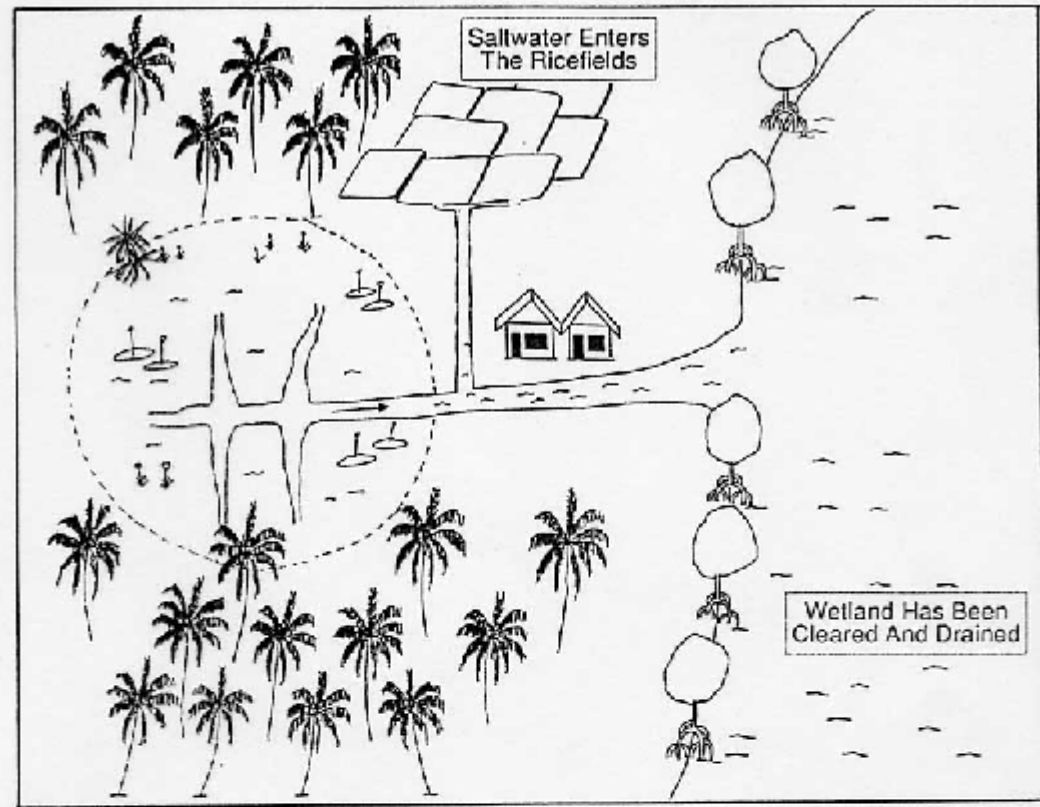


Figure 7b: If the wetlands are drained, saline water intrusion occurs

Figure Six: Prevention of saline water intrusion - groundwater

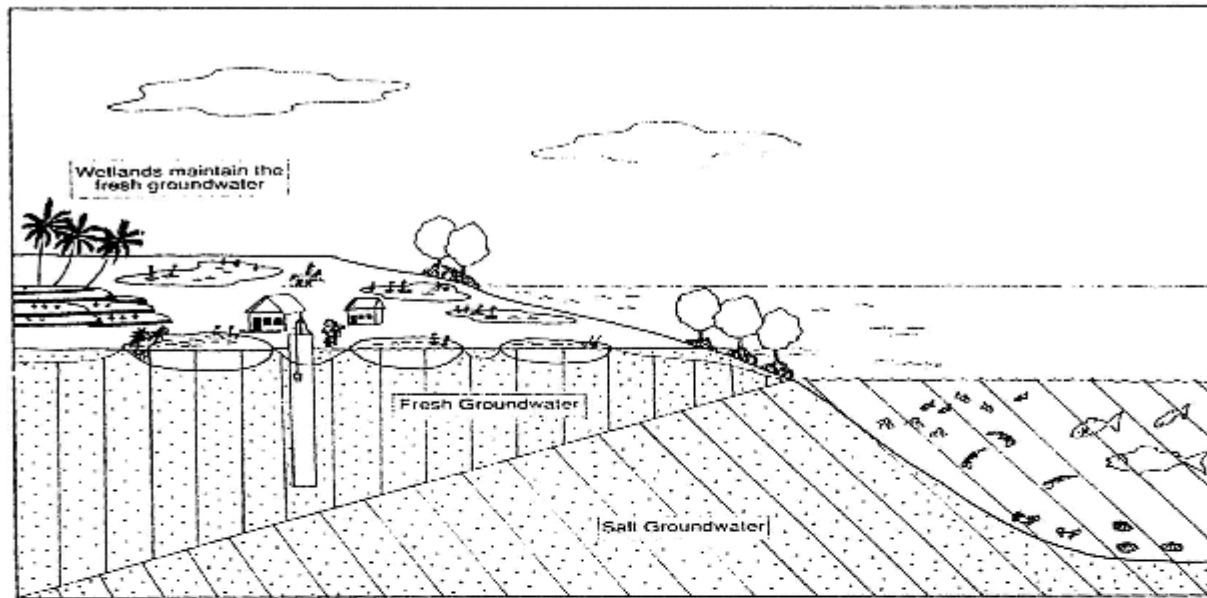


Figure 6a: Prevention of saline water intrusion with wetlands

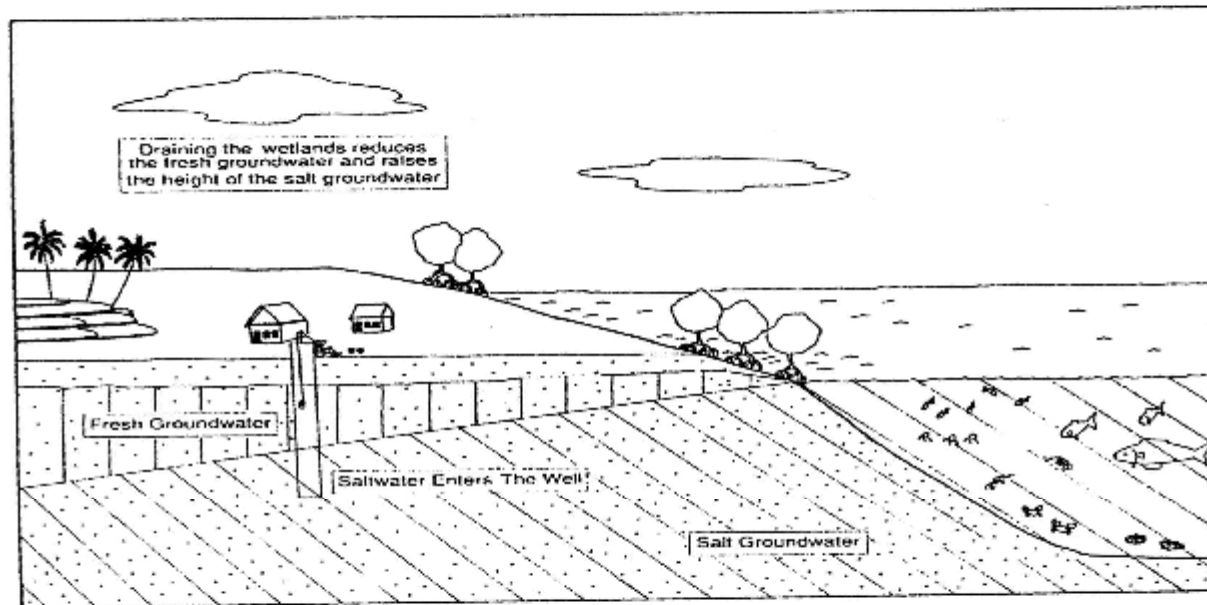


Figure 6b: If the wetlands are cleared, there is saline water intrusion

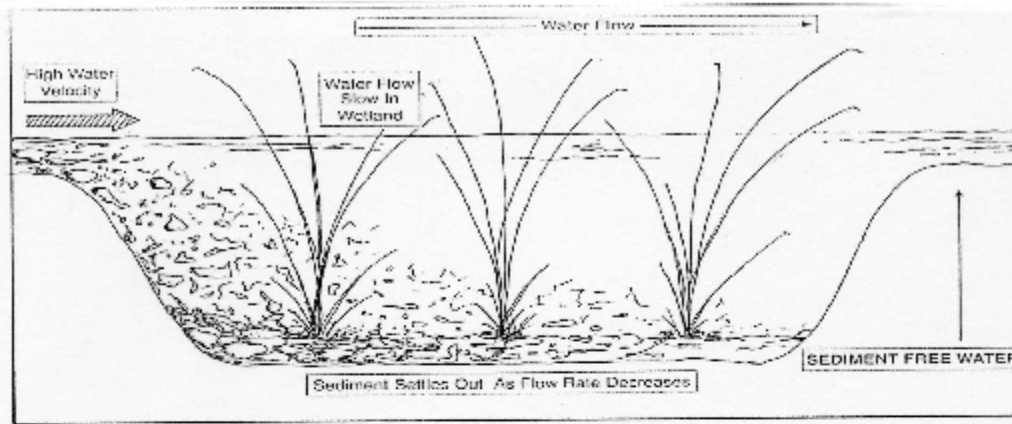


Figure Ten: Sediment removal/retention

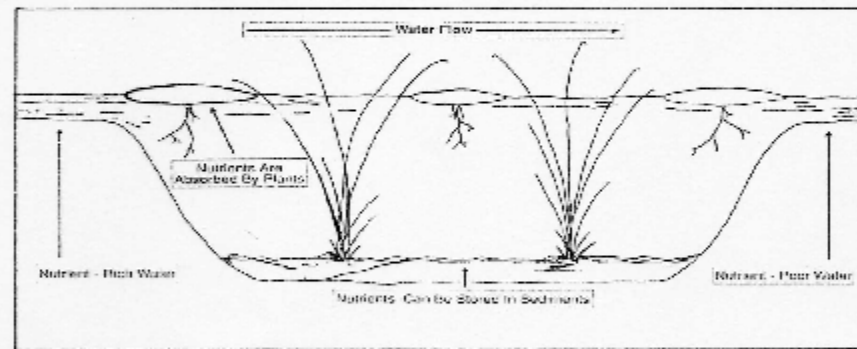


Figure Eleven: Nutrient removal/retention

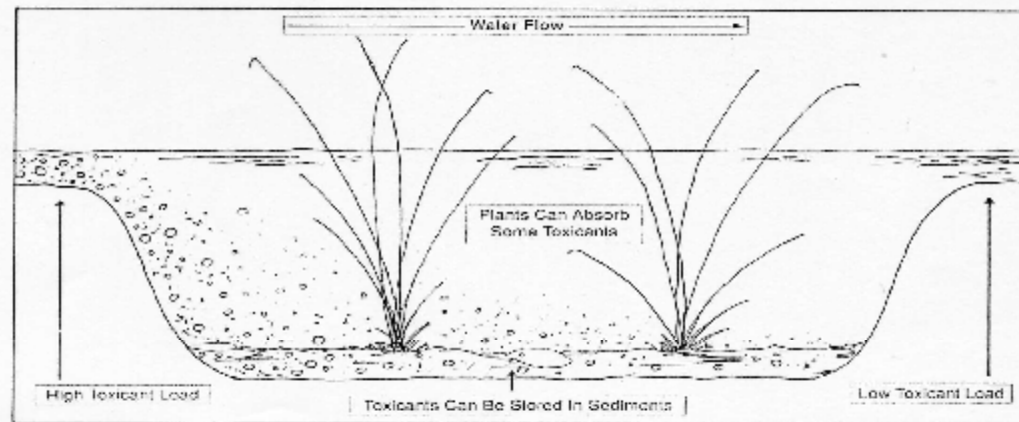


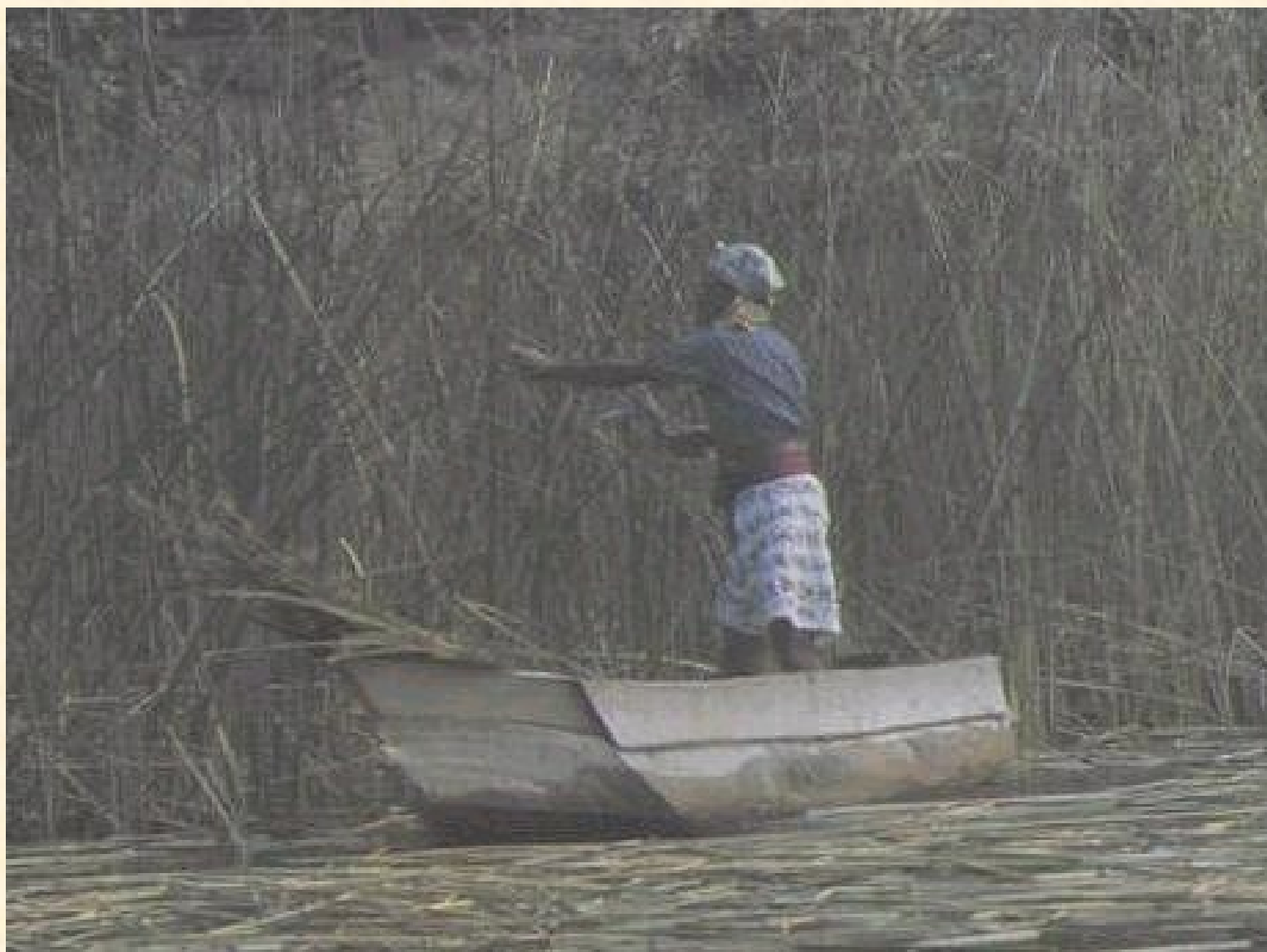
Figure Twelve: Toxicant removal/retention



Harvesting reeds for construction and other uses
(Photo: WWF)



Placing mudskipper traps, Hong Kong (*Photo: WWF/D.S. Melville*)



**Woman collecting reeds, Lake Atitlan,
Guatemala (*Photo: WWF/Anne La Bastille*)**



**Building a 9-km fence round a replanted mangrove,
Samut Songkram, Thailand (*Photo: WWF*)**



Banana Boat used for research, anti-poaching patrols, ecotourism, Bangweulu, Zambia (*Photo: WWF/Franois*)



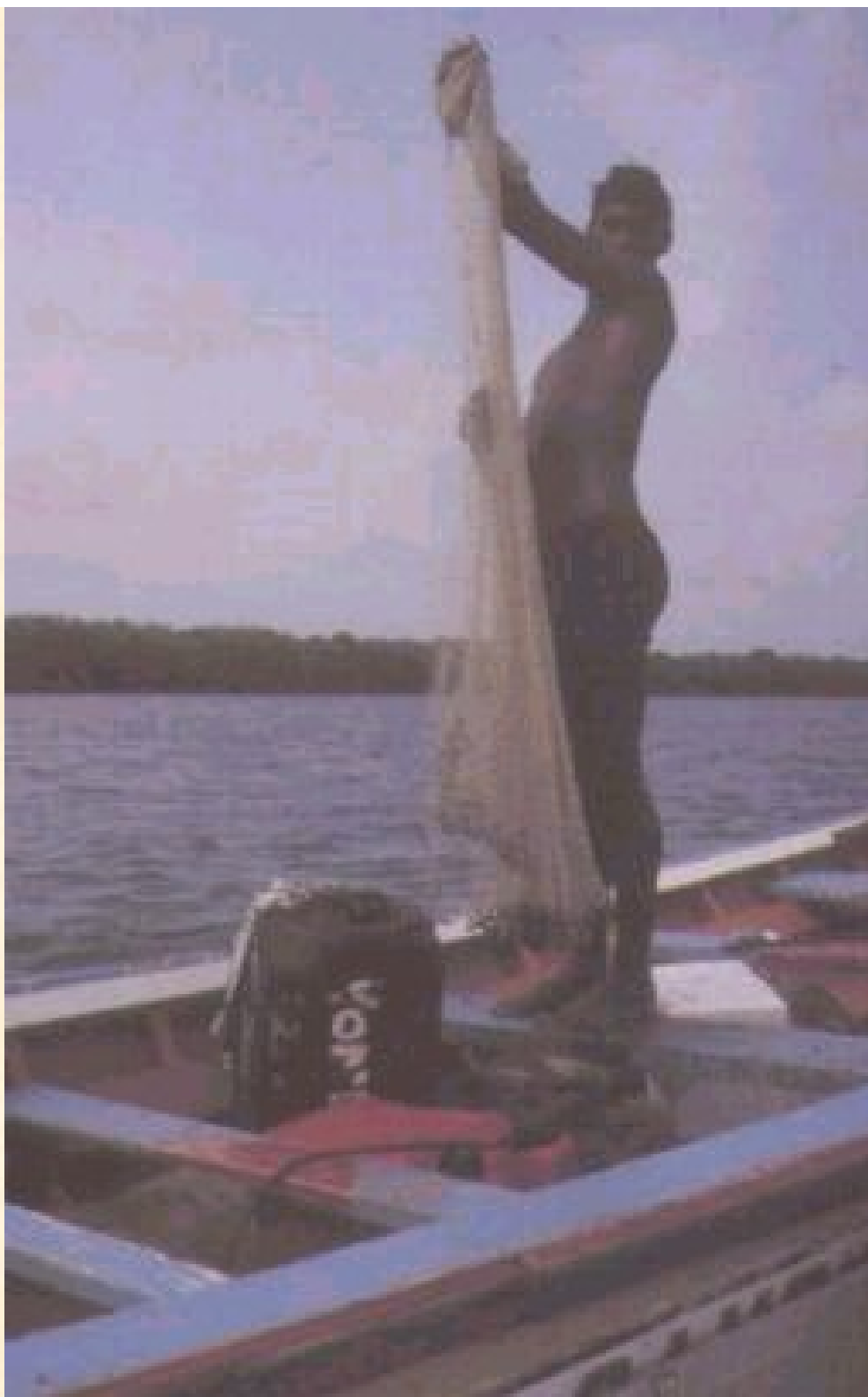
Boat characteristic of Lake Titicaca, shared between Bolivia and Peru (*Photo: Marlowe Tyson Peck, 2000*)₄₀



Traditional fish traps made out of reeds, Menderes Delta, Turkey. (Photo: WWF/Canon, Michel Gunther)⁴¹



Traditional fishing, Los Roques National Park Ramsar site, Venezuela (*Photo: Ramsar/R. Leguen*)



*Los Roques National Park,
Venezuela (Photo:
Ramsar/Roger Leguen)*



Fisherman in Guinea-Bissau



Tharu women fishing, Chitwan area, Nepal (*Photo: Peter Jackson, WWF*)



**Melaleuca harvesting, Mekong Delta, Viet Nam (*Photo:*
Herv Lethier, Ramsar)**



Observation deck, Bearskin Creek, northern Wisconsin, USA (*Photo: D. Peck, Ramsar*)



Kushiro Marsh in Japan

















Thale-Noi non hunting
area

1. Common plant
(*Pandanus immersus*)
2. *Melaleuca* sp.
3. Boat trip

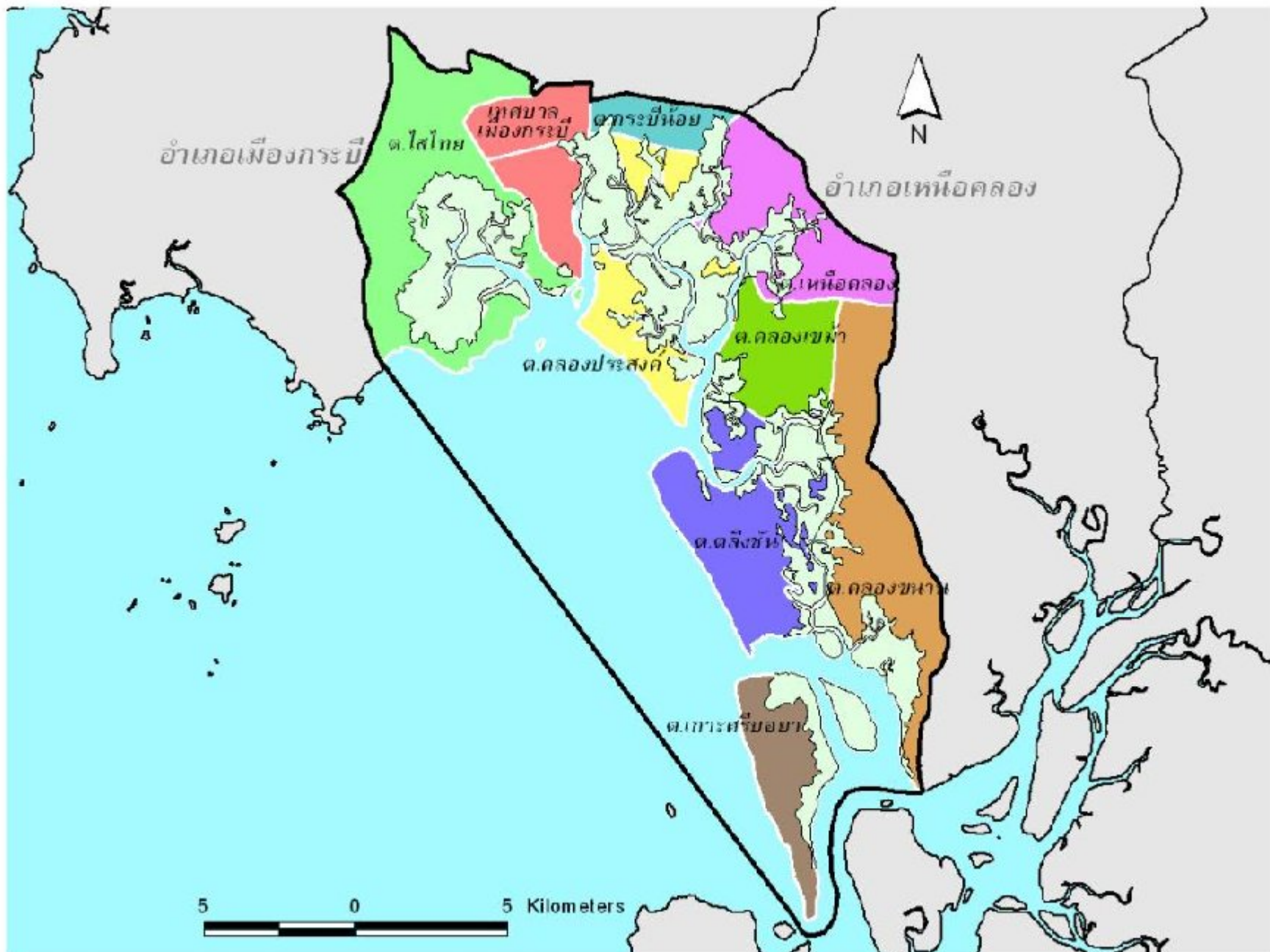


Water supply for agricultural purpose

Kuntulee Peat swamp forest

- Area ~140 ha.
- Plant > 36 spp.
- Fish > 32 spp.

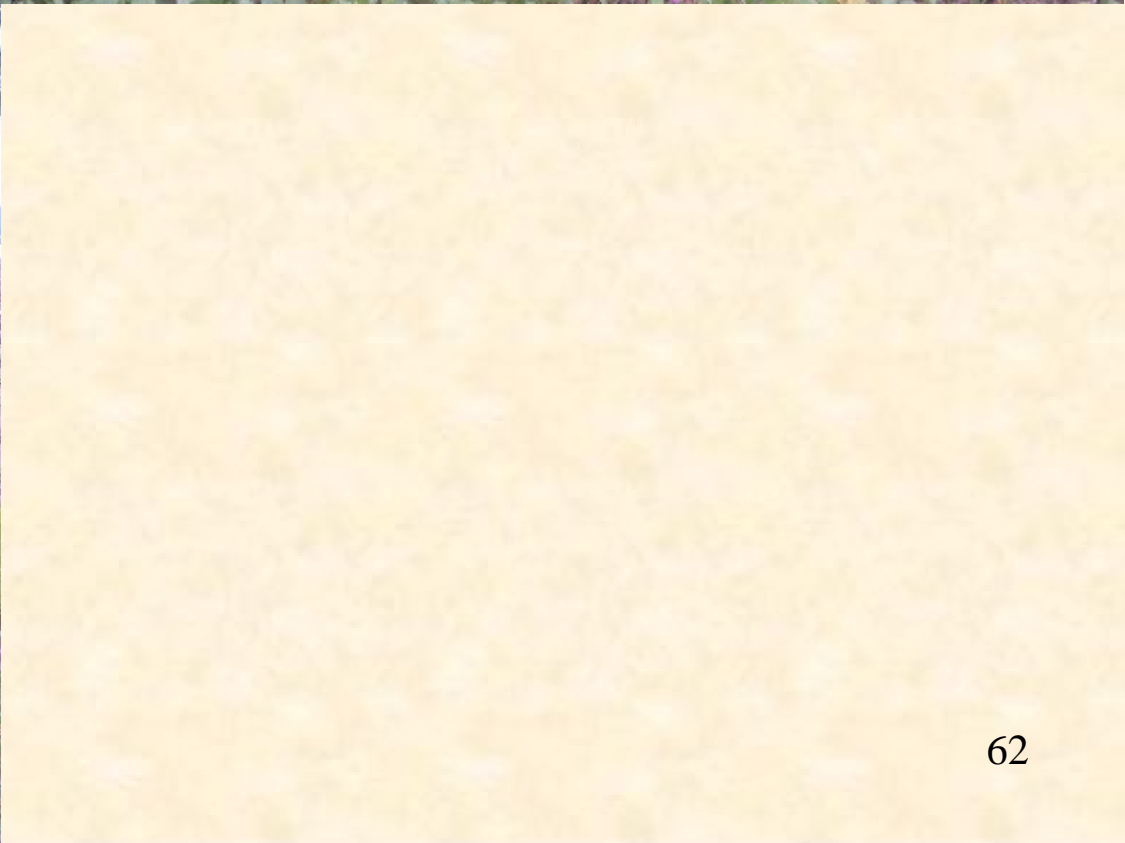
Krabi Estuary

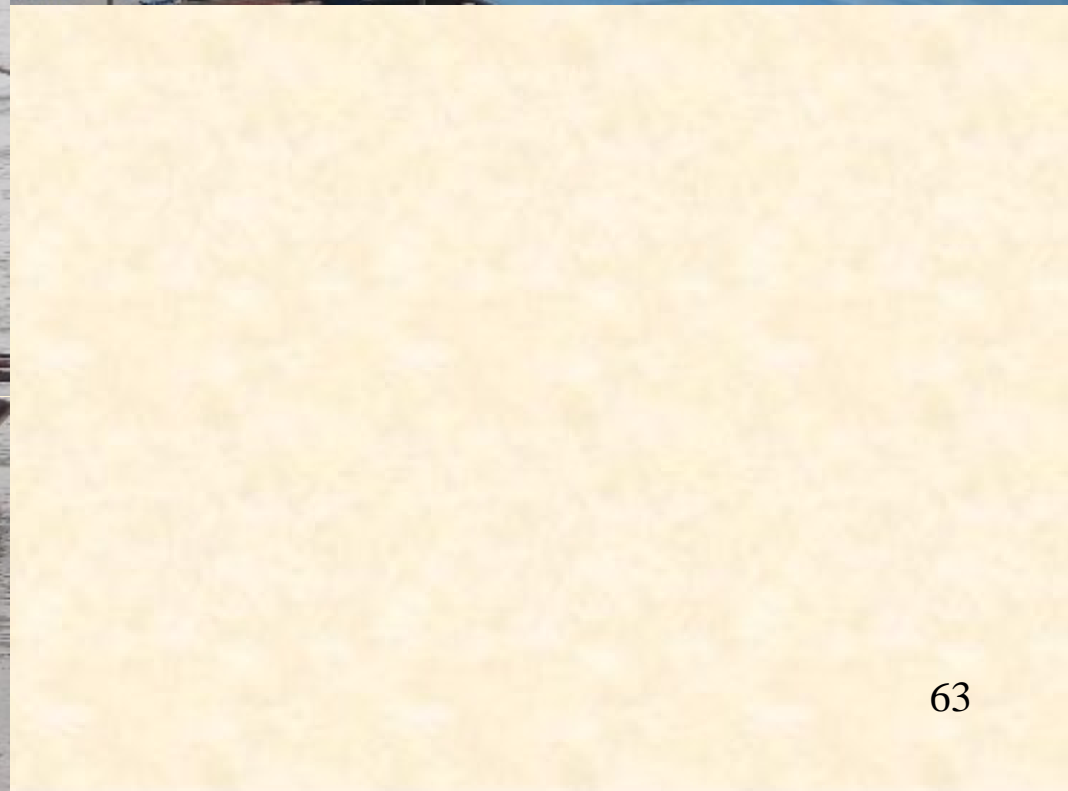






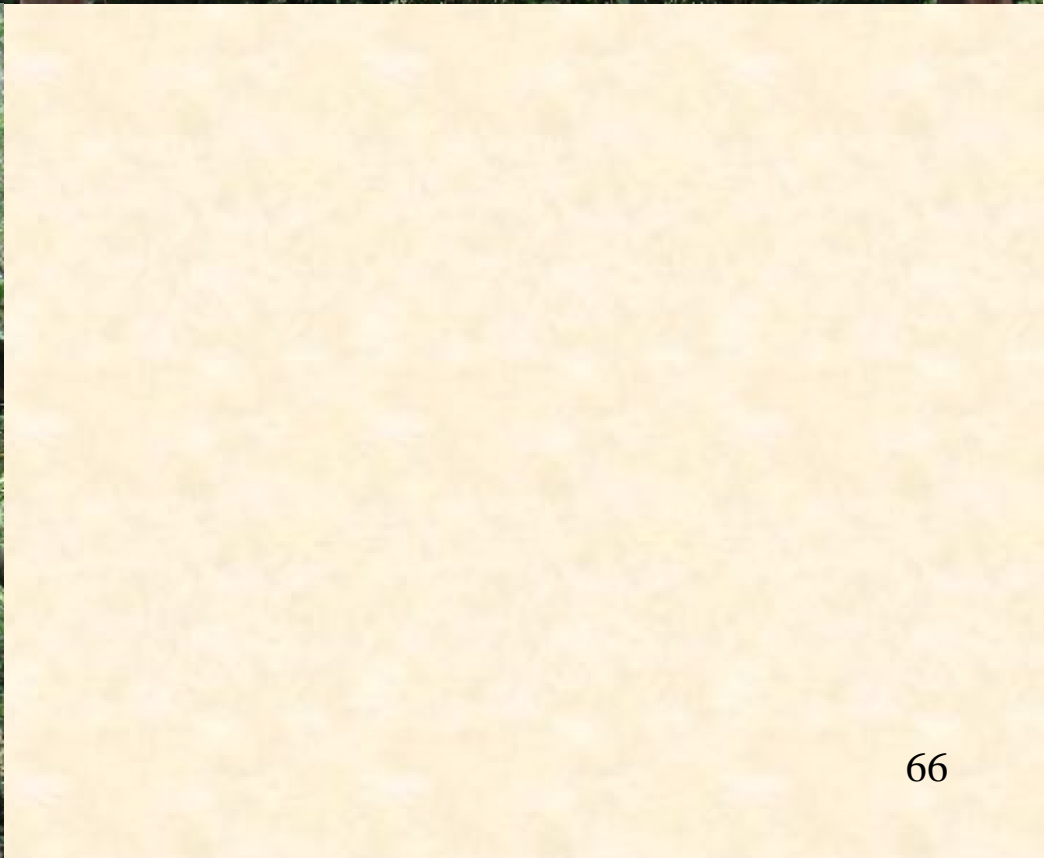












Wetlands area

- About 9% or 5.7 mill.Km² of the Earth's surface is wetlands.
- The proportion is of bogs (30%), fens (26%), swamps (20%) and floodplains (15%), with lakes accounting for just 2% of the total.
- Mangroves cover about 240,000 Km² of coastal area and a estimated 600,000 Km² of coral reefs remain worldwide (WCMC, *Global Biodiversity*, 1992).
- About 56% of wetlands are found in tropical and subtropical regions.
- Almost 1/3 are located in Asia (Mitsch and Gosselink, 2000).

Case study in UNEP/GEF South China Sea project-

Wetlands subcomponent

- Focus activities on five wetland types, namely:
- estuaries (including deltas); where the river mouth widens into a marine ecosystem
- Lagoons; a semi-enclosed coastal basin with limited freshwater input, high salinity and restricted circulation which often lies behind sand dunes
- Intertidal mudflats; usually an unvegetated area, dominated by muddy substrate.
- Peat swamps; high acidity, low nutrient supply, water-logging, and oxygen deficient conditions, the process of decomposition is retarded and dead plant matter accumulates as peat.
- Non-peat swamps; water areas around lake margins, and in parts of floodplains such as oxbows

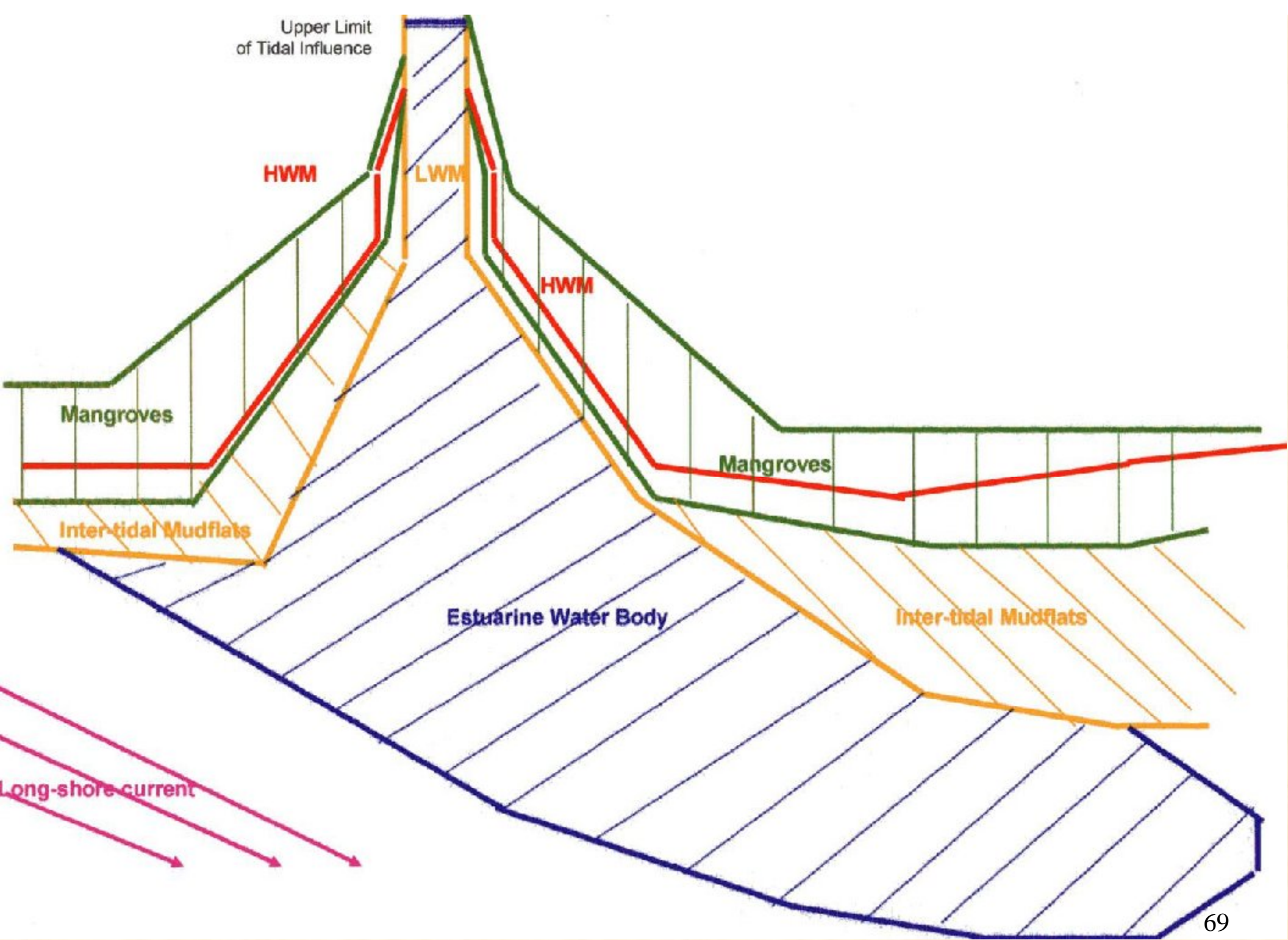


Table 1 Functions, Products and Attributes of Wetlands. (X = Present; √ = common and important value)

	Estuaries	Lagoons	Intertidal Mudflats	Peatswamps	Non-peatswamps
Functions (Services)					
Groundwater recharge				X	X
Groundwater discharge	X	X		X	X
Flood control	X	X		X	
Shoreline stabilization/erosion control	X	X			
Sediment/toxicant retention	X	X	X	√	√
Nutrient retention	X	X	X	√	√
Biomass export	X	X	X		√
Storm protection	X		X		X
Water transport	X	X			
Recreation/tourism	X	X	X	X	X
Products					
Forest resources	√				X
Wildlife resources	√	X	X	X	X
Fisheries	√	X	X		X
Agricultural resources	X			X	
Water supply	X			X	X
Energy Resources				√	
Attributes					
Biological diversity	√	√	√	X	X70
Uniqueness to culture/heritage	X	X	X	X	X

Wetland Loss

- About 50% of wetlands have been lost worldwide since 1900.
- Since the 1950s, tropical and subtropical wetlands especially swamp forests and mangroves have been rapidly disappearing (Stuip, *et al.*, 2002).
- Agriculture is considered the principal cause for wetland loss worldwide
- By 1985, it was estimated the 56%-65%, 27%, 6% and 2% of available wetlands in Europe and North America, Asia, South America and Africa, respectively, had been drained for agriculture (Stuip *et al.*, 2002).
- Overall wetland loss of 31%, 78%, and 22% in Indonesia, Philippines and Thailand, respectively (Scott, 1993).
- Peatland losses of 82%, for Thailand; 71% for West Malaysia; 18% for Indonesia; 13% for China; and, 11% in Sarawak in East Malaysia (Immirzi *et al.*, 1992).



Irrigation canal, Biebrza Marshes, Poland (*Photo: WWF/Fred Hazelhoft*)



Fertilizer in Picardie, France (*Photo: WWF/J. Ziegler*)



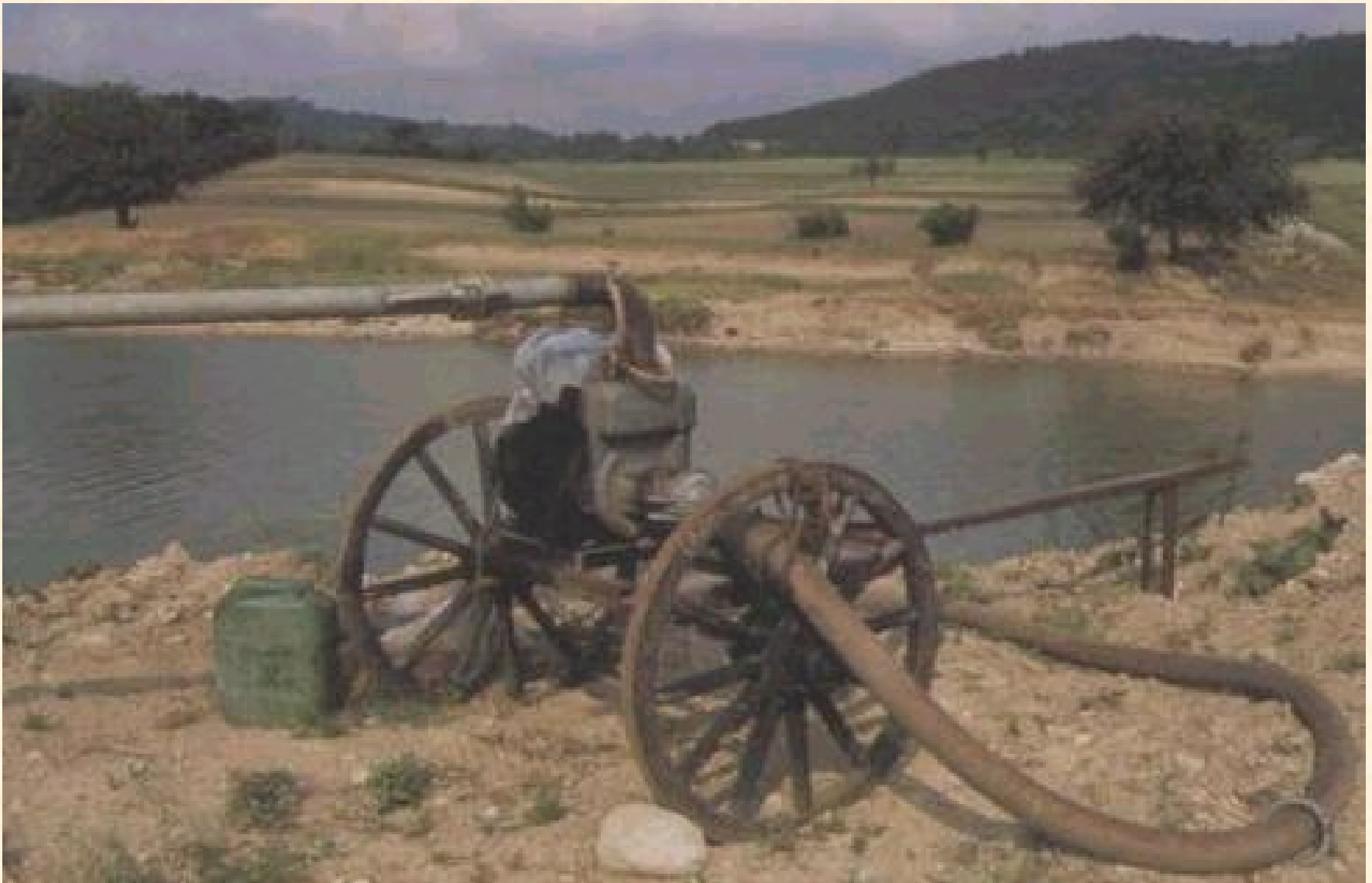
**Inundations caused by heavy rain and destruction of floodplain,
Frankfurt am Main, Germany (*Photo: WWF-Canon/Hartmut
Jungius*)**



Unwise use of wetlands at Knoydard, Scotland (*Photo: WWF/Marek Libersky*)



Polluted pond in the United Kingdom (*Photo: WWF/Jonathan Plant*)



Agriculture and irrigation, Dadia Reserve, Greece (*Photo: WWF/Michel Gunther*)



Dam construction on the Danube, Szigetköz, Hungary
(Photo: WWF/Hartmut Jungius)



Illegal boat dock construction, Lake Chatuga, Georgia (USA)



Cleaning a canal during mating season, Menderes, Turkey.
(Photo: WWF/Michael Gunther)



**Nice new irrigation canals for the Biebrza Marshes, Poland (Photo:
WWF/Fred Hazelhoft)**



The coast of France (*Photo: WWF/J.Ph.Vantighem*)



Palm Oil Tree

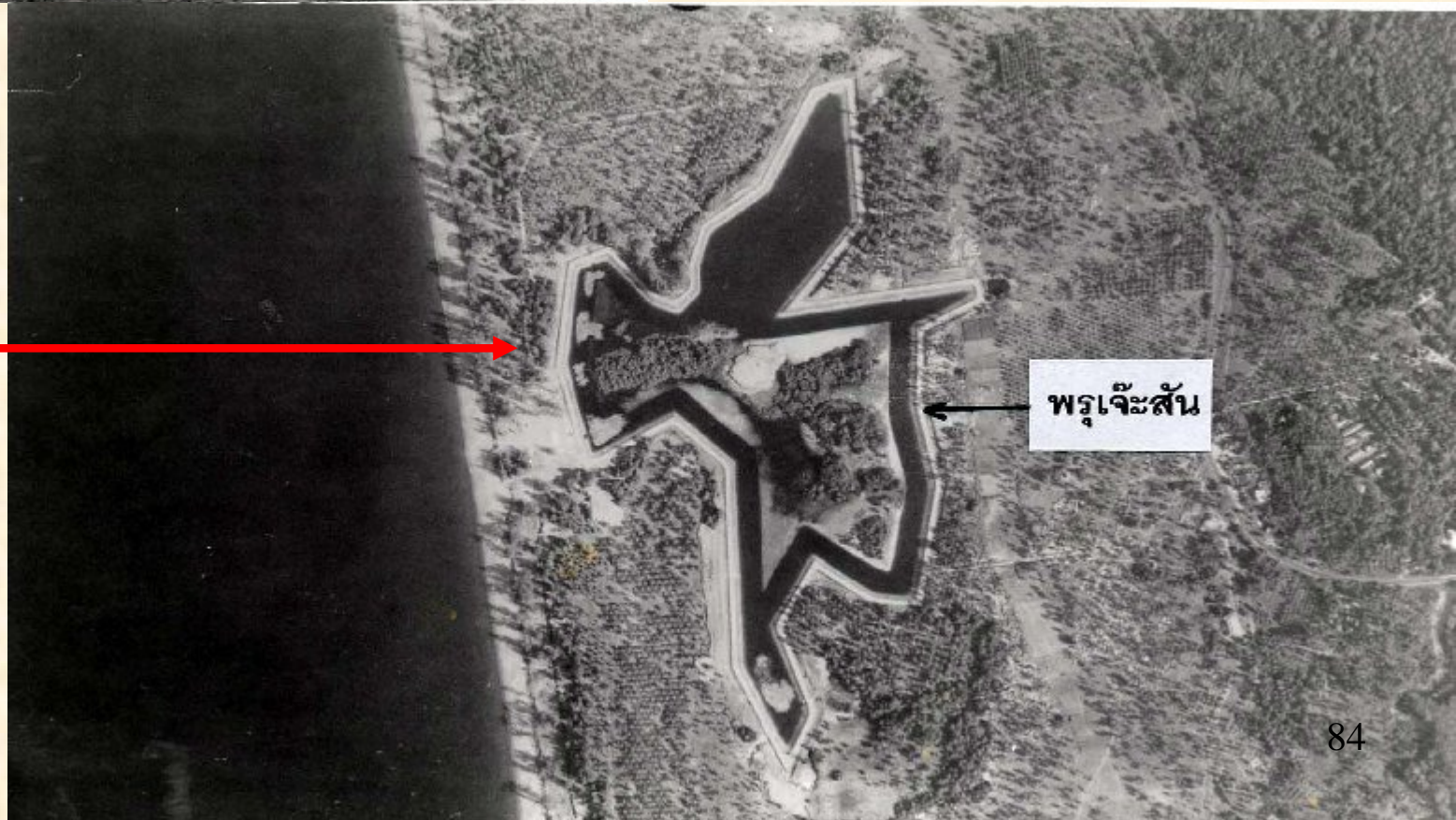
Bajo Peat Swamp forest

Ban Mai Khao peat
swamp (cont.)



Phru Jesun
before
converting to
reservior

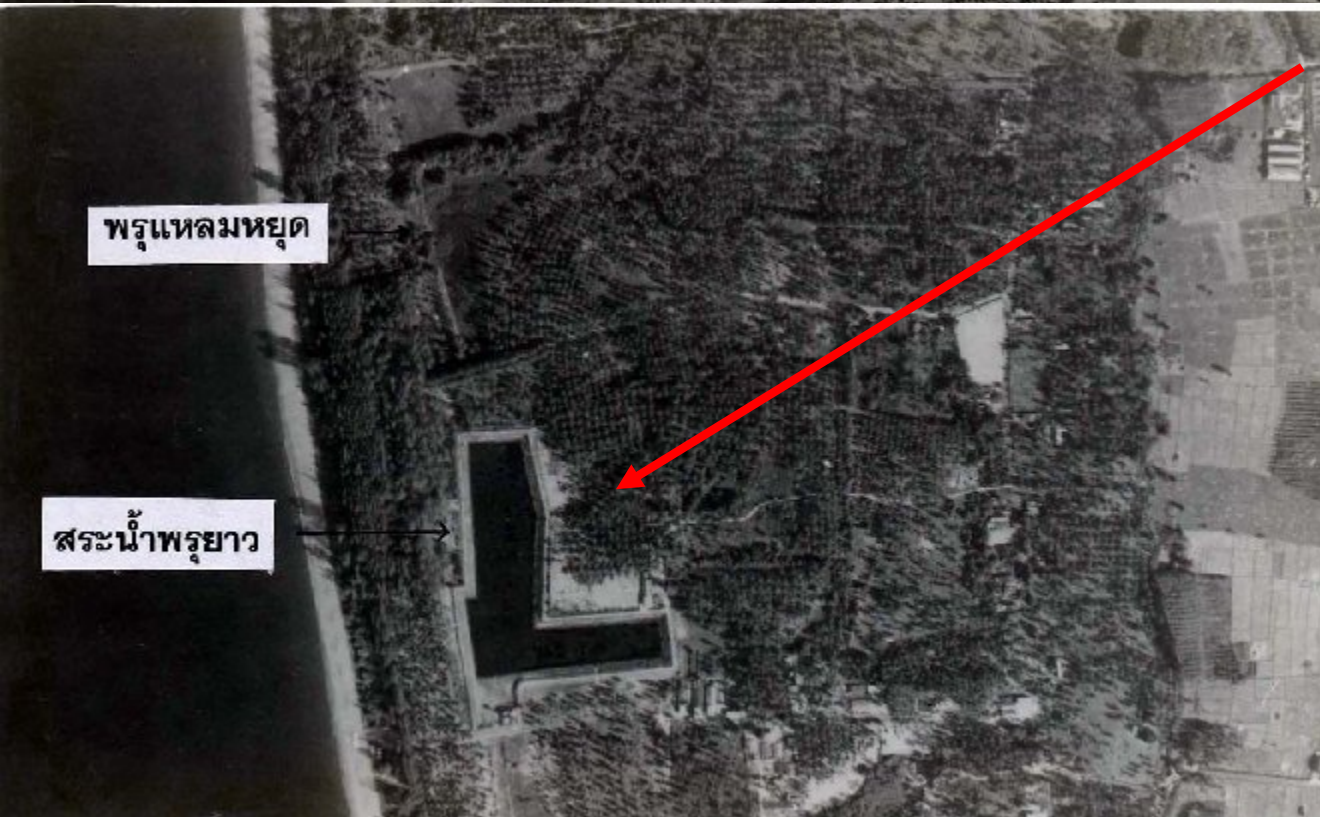
Phru Jesun
after
converting
to reservior



Ban Mai Khao peat swamp (cont.)



Phru Yao before and after converting to village pond



Conclusion

- In 1999, 84% of Ramsar-listed wetlands had undergone or were threatened by ecological change.
- The most widespread threats being drainage for agriculture, settlement and urbanization, pollution and hunting.
- Coastal wetlands play a critical role in protecting coastal land from the influence of violent coastal weather by providing a buffer against storm surges and protecting coastlines from erosion.
- In Malaysia, it has been estimated that the economic gain is US\$300,000 per kilometer from intact mangrove swamps for storm protection and flood control alone, which is the cost of replacing them with rock walls.
- This role of coastal wetlands may become even more important under conditions of changed climate over the next 50-100 years.



This could not be your wetland if

Thank you for your attention